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On account of its intermediate character this plant might be supposed to be a hybrid. Or, it might be considered sufficiently distinct to be described as a new species. However, although it is not typical *Lycopodium selago* L., it is here included in that widely distributed and very variable species, according to the present classification of the genus.

Lloyd and Underwood* give the distribution of *L. selago* as follows: "Greenland, Labrador, Newfoundland, Maine, New Hampshire, Vermont, New York, North Carolina, Idaho, Washington, Alaska, St. George Island (Behring Sea). A plant with strongly reflexed leaves but not otherwise differing from *L. Selago* is represented by specimens as follows:

"IDAHO: Little North Fork Basin

"ALASKA: Sitka

"CANADA: Mud Lake"

It occurs also in Pennsylvania as Poyser† says of it: "Rare. Top of a mountain at the Delaware Water Gap in Monroe County. The only record."

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Observations on some Lycopodiums of Hartland, Vt.

NANCY DARLING

On Sept. 30, 1908, the author found, near one of the Eshqua Bogs, Hartland, Vt., a thriving ring of *Lycopodium sabinaefolium* Willd., growing in the vicinity of young pines in pasture land, and a few rods away from it a wide strip of the blue-green club moss, *L. tristachyum* Pursh. About a year later the two species were dis-

* Loc. cit. 150.

† Poyser, W. A. Fern Bull. 17: 80. J1 1909.

covered growing together in a spot close to the bog, where numerous hummocks displayed the qualities of the plants to great advantage. Here the ring of *L. sabinaefolium* was probably forty feet in diameter and could be easily distinguished by its leaves, which give it the look of a trailing cedar. Reindeer moss, Polytrichums, and Hypnums were mingled with the club mosses, all being in the partial shade of scattered young maples. In this region *L. tristachyum* is very dense in growth, especially where it is in the open. Its funnel-shaped fans are so heavy as to feel almost leaden in the hand; its color is a deep, glaucous blue-green, and its tiny leaves are so closely appressed as to give the branchlets the appearance of being smooth, or lacking the awl-shaped tips; while, in fruiting, it is prolific, five, six, seven, or eight spikes on one peduncle being not unusual.

On July 19, 1910, Mrs. A. B. Morgan and the author, while driving to a nature club meeting at "Fairview," N. Hartland, found a very different form of *L. tristachyum*. The sterile branches of this plant, instead of being funnel-shaped were almost globular, some of them over 14 cm. across, and the branchlets were very narrow, about 1 mm. in width, if leaf tips are excepted. The leaf tips, however, were in some of the branches noticeably spreading, and branches showing this characteristic were looser than the others and tended to form delicate sprays resembling vines. The soil in which this form grows is clay.

Aug. 31, 1910, Mr. P. W. Whiting collected a similar form, in fruit, on Hart Island. All the fertile branches were loose and vinelike, and their peduncles bore two, three, and four spikes, respectively; but some of the branchlets were at least 0.5 mm. wider than those noticed on the N. Hartland plants. The soil of Hart Island is sandy.

Aug. 12, 1911, Mr. J. G. Underwood collected in Spruce

Swamp, on a rocky hill, specimens of a *Lycopodium* whose peduncles bore two, three, and four spikes, similar to those of the Hart Island plants, but whose branches resembled those of *L. complanatum* L. The branchlets were broad and flat, as in the latter species; but the leaf tips were far more spreading, even bristling.

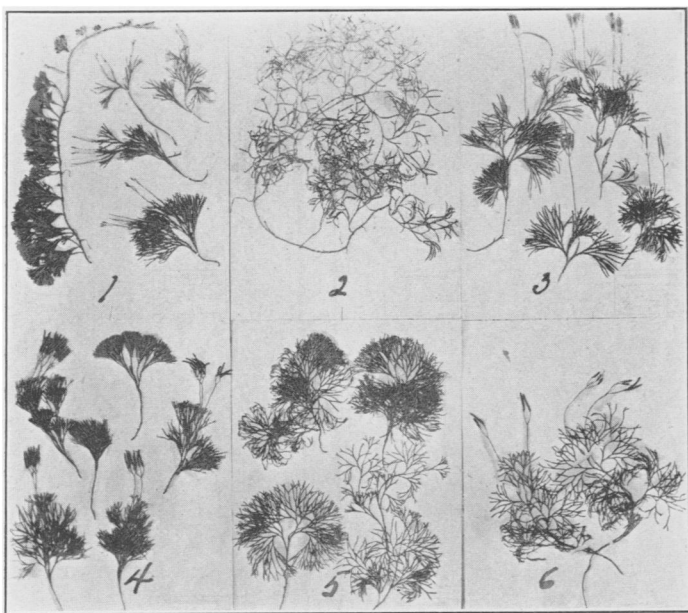
Dr. Ezra Brainerd, of Middlebury, Vt., in 1910, expressed his observation of the apparent mingling of *L. tristachyum* and *L. complanatum* characteristics in specimens from N. Hartland and Hart Island. In the Spruce Swamp form, the crossing of these two species is even more strongly suggested. The soil of Spruce Swamp is, in places, a dry loam, somewhat like that of the Eshqua Bog's outer limits, where the rocks are Conway schists.

Now, the question is, Does *Lycopodium complanatum* L. grow in Hartland? If so, it might cross with *L. tristachyum* Pursh. Mr. W. H. Blanchard has described, in Rhodora for October 1911, a station of it, true to the type, which was discovered May 7, 1910, by Mr. H. G. Rugg, in the Lull Brook valley, near Hartland village. The plants here produce branches that are gracefully diffuse and which are composed of few branchlets. The peduncles bear only one fertile spike each. June 4, 1910, at the base of Garvin Hill, which is over 1800 feet high, the Hartland Nature Club observed another form of *L. complanatum*, some of whose sterile branches are compactly funnelshaped and whose fertile branches resemble those of the Hartland village station. The Garvin Hill plants have peduncles bearing one, two, and three fruiting spikes. Another feature is that the general growth of the running stems takes the form of a ring, as in the case of *L. sabinaefolium*.

Lycopodium tristachyum, then, in Hartland, might cross with *L. complanatum* to produce a hybrid; and as the anomalous forms of *L. tristachyum*, above described, renew their growth from the ends of all the branchlets,

just as in the true *L. tristachyum*, but have the divergent leaf tips of *L. complanatum*, it is possible that they are hybrids of these two species.

Lycopodium complanatum L. var. *flabelliforme* Fernald being very abundant in every part of the town, the crossing may be with that rather than with the type.



LYCOPODIUM

- FIG. 1. *L. complanatum* L., from Garvin Hill.
 2. *L. complanatum* L., from Hartland village.
 3. *L. complanatum flabelliforme* Fernald, from Jenneville.
 4. *L. tristachyum* Pursh, from Eshqua Bog.
 5. *L. tristachyum* Pursh, from North Hartland.
 6. *L. tristachyum* Pursh, from Hart Island.

Indeed, the variety *flabelliforme* varies exceedingly in this section. For instance, in Jenneville, there is a spot, by a branch of Lull Brook, where large plants of it,

growing under maples and young hemlocks, yield peduncles that support one, two, three, four, five, and six spikes, all aberrant, in that each spike is lengthened into an awllike tip of leaves.

On the crest of Sunset Ridge, "Appledore," is a station where the plants show the same characteristics in fruiting, in addition to having the trailing stems form a distinct ring. In the latter place, there are hummocks lying open to the sun, over which some of the *Lycopodium* runs.

Fern students in Hartland invite special observation of these forms on the part of any and all interested in plant morphology and ecology. Specimens of the different lycopodiums mentioned in this article have been placed in the herbarium of the Hartland Nature Club, and photographs of them have been taken by Mrs. Evaline Darling Morgan.

WOODSTOCK, VT.

Carl Frederik Albert Christensen: some biographical notes

R. C. BENEDICT

(WITH PORTRAIT)

Some years ago, in the winter of 1894-1895, a young Danish student who was preparing to take his master's degree in botany at the University of Copenhagen, had occasion, in order to complete his course requirements, to select and develop a topic relating to some special group of plants. The student, Mr. Christensen, chose to study ferns. From that beginning he has continued his work with these plants until, at the present time, he may well be considered the leading active student of ferns.

His Index Filicum is undoubtedly the most useful